

I claim:

1. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encode a heavy chain CDR1 selected from the group consisting of:

(1) $\langle 1 \rangle_1 Y_2 \langle 1 \rangle_3 M_4 \langle 1 \rangle_5$, wherein $\langle 1 \rangle$ is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y;

(2) $(S/T)_1 (S/G/X)_2 (S/G/X)_3 Y_4 Y_5 W_6 (S/G/X)_7$, wherein (S/T) is a 1:1 mixture of S and T residues, (S/G/X) is a mixture of 0.2025 S, 0.2025 G and 0.035 of each of amino acid residues A, D, E, F, H, I, K, L, M, N, P, Q, R, T, V, W, and Y;

(3) $V_1 S_2 G_3 G_4 S_5 I_6 S_7 \langle 1 \rangle_8 \langle 1 \rangle_9 \langle 1 \rangle_{10} Y_{11} Y_{12} W_{13} \langle 1 \rangle_{14}$, wherein $\langle 1 \rangle$ is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y; and

(4) mixtures of vectors or genetic packages characterized by any of the above DNA sequences.

2. The focused library according to claim 1, wherein HC CDR1s (1), (2) and (3) are present in the library in the ratio 0.80:0.17:0.02.

3. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively

display, display and express, or comprise at least a portion of the diversity of the antibody facility, the vectors or genetic packages being characterized by variegated DNA sequences that encode a heavy chain CDR2 selected from the group consisting of:

(1) <2>I<2><3>SGG<1>T<1>YADSVKKG, wherein <1> is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y; <2> is an equimolar mixture of each of amino acid residues Y, R, W, V, G, and S; and <3> is an equimolar mixture of each of amino acid residues P, S, and G or an equimolar mixture of P and S;

(2) <1>I<4><1><1><G><5><1><1><1>YADSVKKG, wherein <1> is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y; <4> is an equimolar mixture of residues D, I, N, S, W, Y; and <5> is an equimolar mixture of residues S, G, D and N;

(3) <1>I<4><1><1><G><5><1><1>YNPSLKG, wherein <1> is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and <4> and <5> are as defined above;

(4) <1>I<8>S<1><1><1>GGYY<1>YAASVKKG, wherein <1> is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; <8> is 0.27 R and 0.027 of each of ADEFGHIKLMNPQSTVWY; and

(5) mixtures of vectors or genetic packages characterized by any of the above DNA sequences.

4. The focused library according to claim 3 wherein a mixture of HC CDR2s (1)/(2) (equimolar), (3) and

(4) are present in the library in a ratio of 0.54:0.43:0.03.

5. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encode a heavy chain CDR3 selected from the group consisting of:

(1) YYCA21111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(2) YYCA2111111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(3) YYCA211111111YFDAYTG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(4) YYCAR111S2S3111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of S and G; and 3 is an equimolar mixture of Y and W;

(5) YYCA2111CSG11CY1YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(6) YYCA211S1TIFG11111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(7) YYCAR111YY2S3344111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; 2 is an equimolar mixture of D and S; and 3 is an equimolar mixture of S and G;

(8) YYCAR1111YC2231CY111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; 2 is an equimolar mixture of S and G; and 3 is an equimolar mixture of T, D and G; and

(9) mixtures of vectors or genetic packages characterized by any of the above DNA sequences.

6. The focused library according to claim 5, wherein 1 in one or all of HC CDR3s (1) through (8) is 0.095 of each of G and Y and 0.048 of each of A, D, E, F, H, I, K, L, M, N, P, Q, R, S, T, V, and W.

7. The focused library according to claim 5 or 6, wherein HC CDR3s (1) through (8) are present in the library in the following proportions:

- (1) 0.10
- (2) 0.14
- (3) 0.25
- (4) 0.13
- (5) 0.13
- (6) 0.11
- (7) 0.04 and
- (8) 0.10

8. The focused library according to claim 5 or 6, wherein the HC CDR3s (1) through (8) are present in the library in the following proportions:

- (1) 0.02
- (2) 0.14
- (3) 0.25
- (4) 0.14
- (5) 0.14
- (6) 0.12
- (7) 0.08 and
- (8) 0.11

9. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encodes a kappa light chain CDR1 selected from the group consisting of:

- (1) RASQ<1>V<2><2><3>LA
- (2) RASQ<1>V<2><2><2><3>LA;

wherein <1> is an equimolar mixture of amino acid residues ADEFGHIKLMNPQRSTVWY; <2> is 0.2 S and 0.044 of each of ADEFGHIKLMNPQRTVWY; and <3> is 0.2Y and 0.044 each of ADEFGHIKLMNPQRTVW and Y; and

(3) mixtures of vectors or genetic packages characterized by any of the above DNA sequences.

10. The focused library of claim 9, wherein CDR1s (1) and (2) are present in the library in a ratio of 0.68:0.32.

11. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encode a kappa light chain CDR2 having the sequence:

$\langle 1 \rangle \text{AS} \langle 2 \rangle \text{R} \langle 4 \rangle \langle 1 \rangle$,

wherein $\langle 1 \rangle$ is an equimolar mixture of amino acid residues ADEFGHIKLMNPQRSTVWY; $\langle 2 \rangle$ is 0.2 S and 0.044 of each of ADEFGHIKLMNPQRSTVWY; and $\langle 4 \rangle$ is 0.2 A and 0.044 each of DEFGHIKLMNPQRSTVWY.

12. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encode a kappa light chain CDR3 selected from the groups consisting of:

(1) $\text{QQ} \langle 3 \rangle \langle 1 \rangle \langle 1 \rangle \langle 1 \rangle \text{P} \langle 1 \rangle \text{T}$,

wherein $\langle 1 \rangle$ is an equimolar mixture of amino acid residues ADEFGHIKLMNPQRSTVWY; $\langle 3 \rangle$ is 0.2 Y and 0.044 each of ADEFGHIKLMNPQRSTVW;

(2) QQ33111P, wherein 1 and 3 are as defined in (1) above;

(3) QQ3211PP1T, wherein 1 and 3 are as defined in (1) above and 2 is 0.2 S and 0.044 each of ADEFGHIKLMNFPQRTVWY; and

(4) mixtures of vectors or genetic packages characterized by any of the above DNA sequences.

13. The focused library according to claim 12, wherein CDR3s (1), (2) and (3) are present in the library in a ratio of 0.65:0.1:0.25.

14. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encode a lambda light chain CDR1 selected from the group consisting of:

(1) TG<1>SS<2>VG<1><3><2><3>VS,
wherein <1> is 0.27 T, 0.27 G and 0.027 each of ADEFHIKLMNQRSVWY, <2> is 0.27 D, 0.27 N and 0.027 each of AEFHIKLMNPQRSTVWY, and <3> is 0.36 Y and 0.036 each of ADEFGHIKLMNFPQRTVW;

(2) G<2><4>L<4><4><4><3><4><4>,
wherein <2> is as defined in (1) above and <4> is an equimolar mixture of amino acid residues ADEFGHIKLMNFPQRTVWY; and

(3) mixtures of vectors or genetic packages characterized by any of the above DNA sequences.

15. The focused library according to claim 14, where CDR1s (1) and (2) are present in the library in a ratio of 0.67:0.33.

16. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encode a lambda light chain CDR2 has the sequence:

$\langle 4 \rangle \langle 4 \rangle \langle 4 \rangle \langle 2 \rangle \text{RPS}$,

wherein $\langle 2 \rangle$ is 0.27 D, 0.27 N, and 0.027 each of A E F G H I K L M P Q R S T V W Y and $\langle 4 \rangle$ is an equimolar mixture of amino acid residues A D E F G H I K L M N P Q R S T V W.

17. A focused library of vectors or genetic packages that display, display and express, or comprise a member of a diverse family of human antibody related peptides, polypeptides and proteins and collectively display, display and express, or comprise at least a portion of the diversity of the antibody family, the vectors or genetic packages being characterized by variegated DNA sequences that encode a lambda light chain CDR3 selected from the group consisting of:

(1) $\langle 4 \rangle \langle 5 \rangle \langle 4 \rangle \langle 2 \rangle \langle 4 \rangle \text{S} \langle 4 \rangle \langle 4 \rangle \langle 4 \rangle \text{V}$,

wherein $\langle 2 \rangle$ is 0.27 D, 0.27 N, and 0.027 each of A E F G H I K L M P Q R S T V W Y; $\langle 4 \rangle$ is an equimolar mixture of amino acid residues A D E F G H I K L M N P Q R S T V W; and $\langle 5 \rangle$ is 0.36 S and 0.0355 each of A D E F G H I K L M N P Q R T V W Y;

(2) <5>SY<1><5>S<5><1><4>V, wherein <1> is an equimolar mixture of ADEFGHIKLMNPQRSTVWY; and <4> and <5> are as defined in (1) above; and

(3) mixtures of vectors or genetic packages characterized by any of the above DNA sequences.

18. The focused library according to claim 17, wherein CDR3s (1) and (2) are present in the library in an equimolar mixture.

19. The focused library according to claim 1 or 2 further comprising variegated DNA sequences that encode a heavy chain CDR selected from the group consisting of:

(1) one or more of the heavy chain CDR2s defined in claim 3 or 4;

(2) one or more of the heavy chain CDR3s defined in claims 5, 6, 7, or 8; and

(3) mixtures of vectors or genetic packages characterized by (1) and (2).

20. The focused library according to claim 3 further comprising variegated DNA sequences that encodes one or more heavy chain CDR3s selected from the group defined in claims 5, 6, 7 or 8.

21. The focused library according to claim 19 or 20, further comprising variegated DNA sequences that encodes a light chain CDR selected from the group consisting of

(1) one or more the kappa light chain CDR1s defined in claim 9 or 10;

(2) the kappa light chain CDR2 defined in claim 11;

(3) one or more of the kappa light chain CDR3s defined in claim 12 or 13;

(4) one or more of the kappa light chain CDR1s defined in claim 14 or 15;

(5) the lambda light chain CDR2 defined in claim 16;

(6) one or more of the lambda light chain CDR3s defined in claim 17 or 18; and

(7) mixtures of vectors and genetic packages characterized by one or more of (1) through (6).

22. A population of variegated DNA sequences that encode a heavy chain CDR1 selected from the group consisting of:

(1) $\langle 1 \rangle_1 Y_2 \langle 1 \rangle_3 M_4 \langle 1 \rangle_5$, wherein $\langle 1 \rangle$ is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y;

(2) $(S/T)_1 (S/G/X)_2 (S/G/X)_3 Y_4 Y_5 W_6 (S/G/X)_7$, wherein (S/T) is a 1:1 mixture of S and T residues, (S/G/X) is a mixture of 0.2025 S, 0.2025 G and 0.035 of each of amino acid residues A, D, E, F, H, I, K, L, M, N, P, Q, R, T, V, W, and Y;

(3) $V_1 S_2 G_3 G_4 S_5 I_6 S_7 \langle 1 \rangle_8 \langle 1 \rangle_9 \langle 1 \rangle_{10} Y_{11} Y_{12} W_{13} \langle 1 \rangle_{14}$, wherein $\langle 1 \rangle$ is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y; and

(4) mixtures of variegated DNA sequences characterized by any of the above DNA sequences.

23. The population of variegated DNA sequences according to claim 22, wherein HC CDR1s (1), (2) and (3) are present in the population in the ratio 0.80:0.17:0.02.

24. A population of variegated DNA sequences that encode a heavy chain CDR2 selected from the group consisting of:

(1) <2>I<2><3>SGG<1>T<1>YADSVKQ, wherein <1> is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y; <2> is an equimolar mixture of each of amino acid residues Y, R, W, V, G, and S; and <3> is an equimolar mixture of each of amino acid residues P, S, and G or an equimolar mixture of P and S;

(2) <1>I<4><1><1><G><5><1><1><1>YADSVKQ, wherein <1> is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W, and Y; <4> is an equimolar mixture of residues D, I, N, S, W, Y; and <5> is an equimolar mixture of residues S, G, D and N;

(3) <1>I<4><1><1>G<5><1><1>YNPSLKG, wherein <1> is an equimolar mixture of each of amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and <4> and <5> are as defined above;

(4) <1>I<8>S<1><1><1>GGYY<1>YAASVKQ, wherein <1> is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; <8> is 0.27 R and 0.027 of each of ADEFGHIKLMNPQSTVWY; and

(5) mixtures of variegated DNA sequences characterized by any of the above DNA sequences.

25. The population of variegated DNA sequences according to claim 24, wherein a mixture of HC CDR2s (1)/(2) (equimolar), (3) and (4) are present in the population in a ratio of 0.54:0.43:0.03.

26. A population of variegated DNA sequences that encode a heavy chain CDR3 selected from the group consisting of:

(1) YYCA21111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(2) YYCA211111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(3) YYCA21111111YFDAYTG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(4) YYCAR111S2S3111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of S and G; and 3 is an equimolar mixture of Y and W;

(5) YYCA2111CSG11CY1YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(6) YYCA211S1TIFG11111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; and 2 is an equimolar mixture of K and R;

(7) YYCAR111YY2S3344111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; 2 is an equimolar mixture of D and S; and 3 is an equimolar mixture of S and G;

(8) YYCAR1111YC2231CY111YFDYWG, wherein 1 is an equimolar mixture of each amino acid residues A, D, E, F, G, H, I, K, L, M, N, P, Q, R, S, T, V, W and Y; 2 is an equimolar mixture of S and G; and 3 is an equimolar mixture of T, D and G; and

(9) mixtures of variegated DNA sequences characterized by any of the above DNA sequences.

27. The population of variegated DNA according to claim 26, wherein 1 in one or all of HC CDR3s (1) through (8) is 0.095 of each of G and Y and 0.048 of each of A, D, E, F, H, I, K, L, M, N, P, Q, R, S, T, V, and W.

28. The population of variegated DNA sequences according to claim 26 or 27, wherein HC CDR3s (1) through (8) are present in the population in the following proportions:

- (1) 0.10
- (2) 0.14
- (3) 0.25
- (4) 0.13
- (5) 0.13
- (6) 0.11
- (7) 0.04 and
- (8) 0.10

29. The population of variegated DNA sequences according to claim 26 or 27, wherein the HC CDR3s (1) through (8) are present in the population in the following proportions:

- (1) 0.02
- (2) 0.14
- (3) 0.25

- (4) 0.14
- (5) 0.14
- (6) 0.12
- (7) 0.08 and
- (8) 0.11

30. A population of variegated DNA sequences that encode a kappa light chain CDR1 selected from the group consisting of:

- (1) RASQ<1>V<2><2><3>LA
- (2) RASQ<1>V<2><2><2><3>LA;

wherein <1> is an equimolar mixture of amino acid residues ADEFGHIKLMNPQRSTVWY; <2> is 0.2 S and 0.044 of each of ADEFGHIKLMNPQRTVWY; and <3> is 0.2Y and 0.044 each of ADEFGHIKLMNPQRTVW and Y; and

(3) mixtures of variegated DNA sequences characterized by any of the above DNA sequences.

31. The population of variegated DNA sequences of claim 30, wherein CDR1s (1) and (2) are present in the population in a ratio of 0.68:0.32.

32. A population of variegated DNA sequences that encode a kappa light chain CDR2 having the sequence:

<1>AS<2>R<4><1>,

wherein <1> is an equimolar mixture of amino acid residues ADEFGHIKLMNPQRSTVWY; <2> is 0.2 S and 0.044 of each of ADEFGHIKLMNPQRTVWY; and <4> is 0.2 A and 0.044 each of DEFGHIKLMNPQRTVWY.

33. A population of variegated DNA sequences that encode a kappa light chain CDR3 selected from the groups consisting of:

(1) QQ<3><1><1><1>P<1>T,
wherein <1> is an equimolar mixture of amino acid residues
ADEFHGHIKLMNPQRSTVWY; <3> is 0.2 Y and 0.044 each of
ADEFHGHIKLMNPQRTVW;

(2) QQ33111P, wherein 1 and 3 are as
defined in (1) above;

(3) QQ3211PP1T, wherein 1 and 3 are as
defined in (1) above and 2 is 0.2 S and 0.044 each of
ADEFHGHIKLMNPQRTVWY; and

(4) mixtures of variegated DNA sequences
characterized by any of the above DNA sequences.

34. The population of variegated DNA sequences
according to claim 33, wherein CDR3s (1), (2) and (3) are
present in the population in a ratio of 0.65:0.1:0.25.

35. A population of variegated DNA sequences
that encode a lambda light chain CDR1 selected from the
group consisting of:

(1) TG<1>SS<2>VG<1><3><2><3>VS,
wherein <1> is 0.27 T, 0.27 G and 0.027 each of
ADEFHGHIKLMNPQRSVWY, <2> is 0.27 D, 0.27 N and 0.027 each of
ADEFHGHIKLMNPQRSTVWY, and <3> is 0.36 Y and 0.036 each of
ADEFHGHIKLMNPQRSTVW;

(2) G<2><4>L<4><4><4><3><4><4>,
wherein <2> is as defined in (1) above and <4> is an
equimolar mixture of amino acid residues
ADEFHGHIKLMNPQRSTVWY; and

(3) mixtures of variegated DNA sequences
characterized by any of the above DNA sequences.

36. The population of variegated DNA sequences according to claim 35, where CDR1s (1) and (2) are present in the population in a ratio of 0.67:0.33.

37. A population of variegated DNA sequences that encode a lambda light chain CDR2 has the sequence:
<4><4><4><2>RPS,
wherein <2> is 0.27 D, 0.27 N, and 0.027 each of AEFQHIKLMNPQRSTVWY and <4> is an equimolar mixture of amino acid residues ADEFGHIKLMNPQRSTVW.

38. A population of variegated DNA sequences that encode a lambda light chain CDR3 selected from the group consisting of:

(1) <4><5><4><2><4>S<4><4><4><4>V,
wherein <2> is 0.27 D, 0.27 N, and 0.027 each of AEFQHIKLMNPQRSTVWY; <4> is an equimolar mixture of amino acid residues ADEFGHIKLMNPQRSTVW; and <5> is 0.36 S and 0.0355 each of ADEFGHIKLMNPQRTVWY;

(2) <5>SY<1><5>S<5><1><4>V, wherein <1> is an equimolar mixture of ADEFGHIKLMNPQRSTVWY; and <4> and <5> are as defined in (1) above; and

(3) mixtures of variegated DNA sequence characterized by any of the above DNA sequences.

39. The population of variegated DNA sequences according to claim 38, wherein CDR3s (1) and (2) are present in the population in an equimolar mixture.

40. The population of variegated DNA sequences according to claim 22 or 23 further comprising variegated DNA sequences that encode a heavy chain CDR selected from the group consisting of:

(1) one or more of the heavy chain CDR2s defined in claim 24 or 25;

(2) one or more of the heavy chain CDR3s defined in claims 26, 27, 28 or 29; and

(3) mixtures of variegated DNA sequence characterized by (1) and (2).

41. The population of variegated DNA sequences according to claim 24 further comprising variegated DNA sequences that encodes one or more heavy chain CDR3s selected from the group defined in claims 26, 27, 28 or 29.

42. The population of variegated DNA sequences according to claim 40 or 41 further comprising variegated DNA sequences that encodes a light chain CDR selected from the group consisting of

(1) one or more the kappa light chain CDR1s defined in claim 30 or 31;

(2) the kappa light chain CDR2 defined in claim 32;

(3) one or more of the kappa light chain CDR3s defined in claim 33 or 34;

(4) one or more of the kappa light chain CDR1s defined in claim 35 or 36;

(5) the lambda light chain CDR2 defined in claim 37;

(6) one or more of the lambda light chain CDR3s defined in claim 38 or 39; and

(7) mixtures of variegated DNA sequences characterized by one or more of (1) through (6).

43. A population of vectors comprising the variegated DNA sequences of any one of claims 22-42.